

Patent Claims:

1. Method for the calibration or mechanical adjustment or calculation of a drive current, in particular the opening current, of at least one electrically operable actuator for controlling the flow $G(\Delta P, I, KG)$ of a fluid responsive to the differential pressure, wherein the indicator of the influencing of the pressure caused by the actuator can be determined in advance by the intensity of the electric actuation of the actuator even without the use of pressure sensors, with one or more actuator-related characteristic curves, characteristic fields, or parameters KG_{ind} for the actuator being taken into account so that by means of these parameters a nominal flow G can be adjusted in a defined fashion in dependence on the current intensity I ,
c h a r a c t e r i z e d in that the actuator-related parameters are established automatically without using pressurizations (differential pressure $\Delta P = 0$) of the actuator.
2. Method as claimed in claim 1,
c h a r a c t e r i z e d in that the opening travel l and/or the spring force F_{spring} of the actuator are determined for the calculation of the actuator-related parameters.
3. Method as claimed in claim 1 or 2,
c h a r a c t e r i z e d in that beside the

actuator-related parameters KG_{ind} , general parameters KG_{gen} related to the line of products are taken into consideration for calculating the drive current.

4. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the functional interrelationship of the flow G in dependence on the drive current I is approximated according to the formula $G = G_0 + m * I$, where the pressure gradient G_0 at a current of $I = 0$ is determined by measuring at least one individual magnetic parameter, with the valve open and/or closed, and in particular the at least one parameter is determined by measuring the magnetic resistance, with the valve open and closed, and/or the spring force.
5. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the general parameters KG_{gen} of the actuator, being related to the line of products, are durably stored in a memory, and these parameters are transferred into the accumulator in particular at the end of the assembly line at the latest.
6. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the tappet force or the magnetic resistance RM is determined as actuator-related parameters, in particular in the fully opened and/or fully closed position of the actuator.

7. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the position of the tappet is determined from the tappet force or the magnetic resistance.
8. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the voltage induced at the drive coil as a consequence of a current variation is measured and more particularly integrated.
9. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the flux Φ or the magnetic resistance RM is controlled by way of a control loop.
10. Method as claimed in at least one of the preceding claims,
c h a r a c t e r i z e d in that the holding current and/or opening current of the actuator is determined from the actuator-related parameters.
11. Actuator, in particular a hydraulic brake control unit with at least one electromagnetically operable hydraulic valve, comprising an electromagnetic coil (6) and a tappet (8) moved by an armature (7), wherein the armature is moved, influenced by the current, to open and/or close the actuator,
c h a r a c t e r i z e d in that the actuator is

provided with one or more additional measuring elements (2) to determine the magnetic flux.

12. Actuator as claimed in claim 11,
c h a r a c t e r i z e d in that the measuring
element is a measuring coil (2).
13. Actuator as claimed in claim 11 or 12,
c h a r a c t e r i z e d in that the measuring
element determines the magnetic flux of at least one
actuator component.
14. Method for adjusting the opening position and/or the
flow through an electrically drivable actuator, in
particular an actuator as claimed in at least any one
of claims 11 to 13,
c h a r a c t e r i z e d in that in the area of the
actuator at least one measuring element (2), in
particular at least one measuring coil (2), is
arranged, and the measuring signal of the measuring
element is used to control the drive current.
15. Method as claimed in claim 14,
c h a r a c t e r i z e d in that the measuring
signal of the measuring element (2) is a voltage which
is, in particular, integrated thereto.
16. Method as claimed in claim 15,
c h a r a c t e r i z e d in that determined from the
integrated voltage is the magnetic flux, and determined
therefrom are the magnetic force and/or the tappet
stroke.

17. Method as claimed in at least one of claims 1 to 10 or at least one of claims 13 to 16,
c h a r a c t e r i z e d in that the valve opening current is corrected by a correction term which also takes into consideration the current-responsive influence of the ferromagnetic circuit.
18. Method as claimed in at least one of claims 1 to 10 or at least one of claims 13 to 17,
c h a r a c t e r i z e d in that initially the valve holding current is calculated, and the valve opening current is determined therefrom by means of an additional correction term or an offset.
19. Method as claimed in at least one of claims 1 to 10 or at least one of claims 13 to 18,
c h a r a c t e r i z e d in that the actuator is driven by means of a pulse-width modulated current (PWM), and the coil resistance is determined by way of the duty cycle of the PWM actuation, and in that the coil resistance is also taken into account in the calculation of the parameters KG_{ind} in each individual actuator.
20. Method for the pressure measurement of a fluid by means of an electromagnetically driven actuator without additional pressure sensors, in particular in a hydraulic device for brake control,
c h a r a c t e r i z e d in that the tappet position is controlled by means of an electric control circuit,

and the pressure in the fluid line and/or the pressure difference is calculated in the actuator from the force that acts on the tappet and can be measured electrically.

21. Method as claimed in claim 20,
c h a r a c t e r i z e d in that an actuator
according to any one of claims 11 to 13 is employed.